LAKE KANASATKA

2013 SAMPLING HIGHLIGHTS

MOULTONBOROUGH, NH

NEW HAMPSHIRE

LAKES LAY MONITORING

Lake Kanasatka volunteers collected water quality data between May 27 and October 19, 2013. A more in depth water quality survey of the Lake Kanasatka deep sampling station was conducted by the Center for Freshwater Biology on August 4, 2013.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

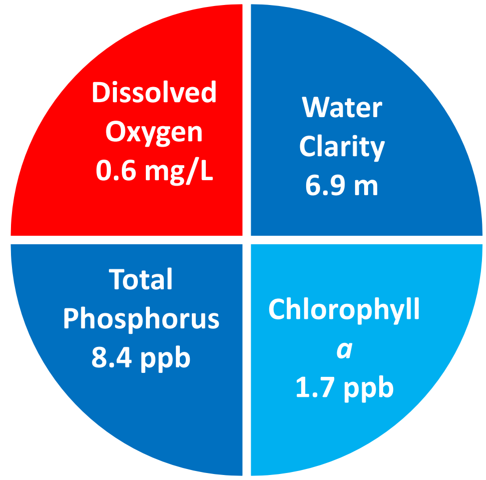

Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 6.9 meters (m) in Lake Kanasatka. The 2013 Lake Kanasatka water clarity was slightly shallower than the 2012 water clarity.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 1.7 parts per billion (ppb) in Lake Kanasatka. The 2013 Lake Kanasatka chlorophyll *a* concentration was slightly higher (greener water) than the 2012 concentration.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus measured 8.4 parts per billion (ppb) in the surface waters. The surface water total phosphorus concentration remained below 10 parts per billion (ppb) that is considered sufficient to support green water events that are referred to as algal blooms.

DISSOLVED OXYGEN: Dissolved oxygen is important for the health of fisheries. Dissolved oxygen concentrations measured in the bottom waters ranged from 0.5 to 0.8 milligrams per liter (mg/L) on August 4, 2013. The dissolved oxygen concentrations in the deep and cold waters were below the 5.0 mg/L threshold required for the successful growth and reproduction of coldwater fish, such as trout and salmon.

COLOR: Color is a result of naturally occurring "tea" colored substances from the breakdown of soils and plant materials. The Lake Kanasatka color averaged 15.2 color units (CPU). Wet years tend to increase wetland drainage and the associated dissolved colored substances that enter the lake. This increase in the "tea" color reduces light penetration, and is oftentimes associated with reduced water clarity.

ALKALINITY: Alkalinity measures the lake's resistance against acid rain. The Lake Kanasatka alkalinity measured 15.8 milligrams per liter (mg/L). The 2013 alkalinity indicates Lake Kanasatka has a low vulnerability to acid rain. The Lake Kanasatka **pH**, a measure of lake acidity, ranged from 7.5 to 7.6 units in the surface waters and remained within the acceptable range for most aquatic organisms.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. The Lake Kanasatka specific conductivity ranged from 78 to 171 micro-Siemans per centimeter (uS/cm). The Lake Kanasatka specific conductivity indicates moderate to high concentrations of dissolved substances such as nutrients (e.g. phosphorus and nitrogen) and other dissolved salts (e.g. sodium and chloride).

CYANOBACTERIA: Cyanobacteria are plant-like bacteria that include nuisance forms that are sometimes associated with green water events known as algal blooms. Three potentially nuisance forms, *Oscillitoria*, *Anabaena* and *Woronochinia*, were documented on August 4 at a depth of 6.5 meters (m). All three types of these cyanobacteria have the potential to produce toxins, such as microcystin (refer to Table 1 and the recommendations section).

Note: Site 1 Deep (see map) was used as the reference point to give an overall representation of the Lake Kanasatka water quality (discussed above). For a more detailed discussion of water quality measurements, please refer to the executive summary within the annual Lake Kanasatka report.

Table 1. 2013 Lake Kanasatka Seasonal Average Water Quality Readings and Trophic Level Classification Criteria used by the New Hampshire Lakes Lay Monitoring Program

Parameter	Ultraoligotrophic "Outstanding"	Oligo "Excellent"	Meso "Fair"	Eutrophic "Poor"	Lake Kanasatka Average (range)	Lake Kanasatka Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	**6.9** meters (range: 5.8 – 9.3)	Oligotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	**1.7** ppb (range: 0.5 – 2.7)	Ultraoligotrophic
Total Phosphorus (ppb)	< 7.0	15.0 – 7.0	15.0 - 25.0	> 25.0	**8.4** ppb (range: 8.4 – 8.4)	Oligotrophic
Dissolved Oxygen (mg/L)	> 7.0	5.0 – 7.0	2.0 – 5.0	<2.0	**0.6** mg/L (range: 0.5 – 0.8)	Eutrophic
Cyanobacteria (cell counts, microcystin concentration & Water safety)	The Massachusetts Department of Public Health considers dangerous microcystin (MC) levels to be 14 micrograms per liter (ug/l) lake water, and/or 70,000 cyanobacteria cells per milliliter lake water.			The New Hampshire Department of Environmental services posts warnings at State beaches when cyanobacteria cell numbers exceed 70,000 cells per milliliter lake water.		

*** Dissolved oxygen concentrations taken from the bottom layers**

LONG TERM TRENDS

WATER CLARITY: The Lake Kanasatka water clarity has increased approximately 20 centimeters (cm) over the past 31 years of water quality monitoring. However, the trend of increasing water clarity is not statistically significant.

CHLOROPHYLL: The Lake Kanasatka chlorophyll *a* concentration displays a relatively stable trend line over the past 31 years of water quality monitoring. However, the trend is not statistically significant.

COLOR: The Lake Kanasatka color data indicate a trend of increasing color over the past twenty-eight years of sampling. However, the trend is not statistically significant.

TOTAL PHOSPHORUS: The Lake Kanasatka total phosphorus concentrations have increased over the past twenty-eight years of sampling. However, the trend is not statistically significant

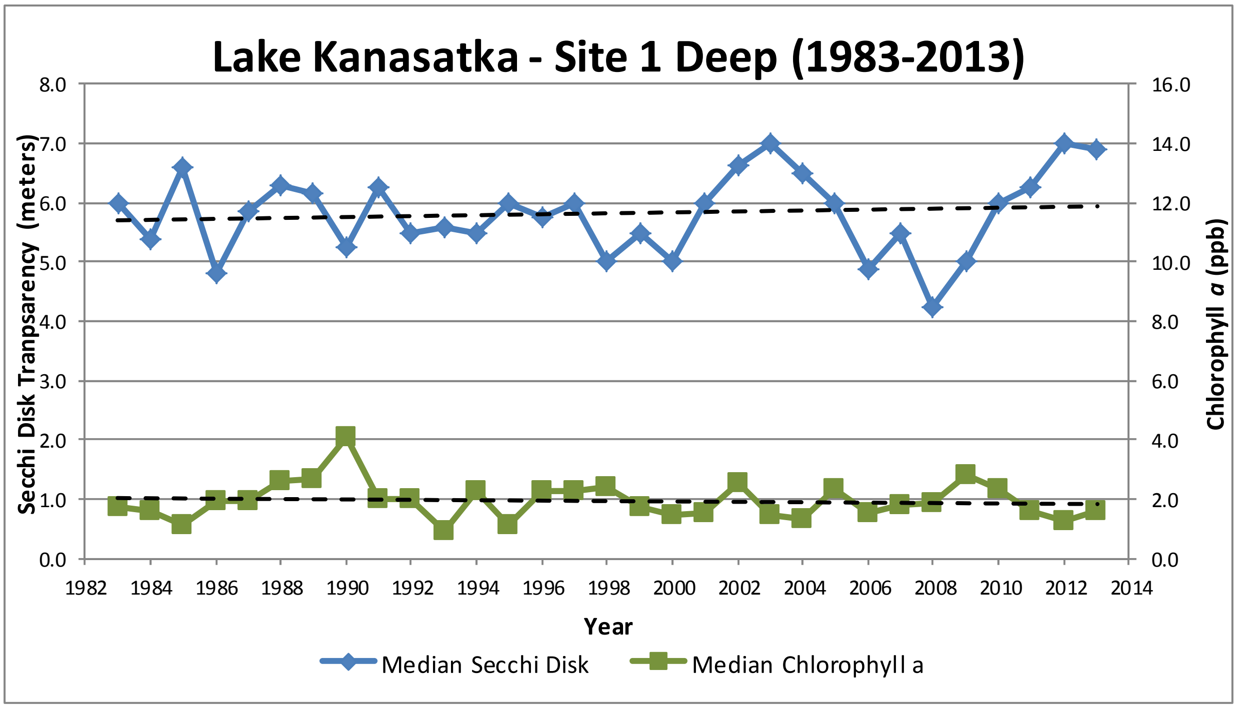

Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1983-2013 at Site 1 Deep. There has been an increasing water clarity trend shown by deeper Secchi disk depth with time. However, the trend is not statistically significant (dashed line). Algal growth (chlorophyll; dashed line) has decreased slighty over the past thirty-one years of sampling and displays a relatively stable trend line. However the trend is not statistically significant.

Recommendations:

- Begin sampling early in the season (April/May) to document Lake Kanasatka's reaction to the period of spring thaw and periods of high streamflow.
- Consider adding a simple cyanobacteria monitoring routine that is based on the existing water quality monitoring methods. Cyanobacteria collections throughout the summer and fall months can give insight as to how these populations are distributed throughout the seasons and when they are most likely to reach potentially harmful levels. If you are interested in discussing additional water quality monitoring options that would meet your needs please contact Bob Craycraft @ 862-3696 or bob.craycraft@unh.edu.
- Implement Best Management Practices within the Lake Kanasatka watershed to minimize the adverse impacts of polluted runoff and erosion into the lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.
    - https://extension.unh.edu/resources/files/Resource001799_Rep2518.pdf
    - http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

Kanasatka Lake

Moutlonborough, NH

2013 Deep water sampling sites with average seasonal water clarity

Miles
0 0.0750.15 0.3 0.45 0.6

Aerial Orthophoto Source: NH GRANIT
Site locations GPSed by the UNH Center of Freshwater Biology

University of New Hampshire
Cooperative Extension